3-300 SEWER DESIGN CRITERIA

3-301 **Design capacity** sewer trunks and mains; - The design criteria for public sewers is based on residential (R1) zoning and land use with a density of 4 dwelling units per acre and 3.3 persons per dwelling unit. Use these figures unless more accurate population or land use studies are available:

3-301.1 **Sewage production**

(1) Residential = 80 gallons (304 lpcd) per capita per day (gpcd) or 265 gallons (1006 liters) per EDU, per day.

(2) School flow:

a) Elementary Schools: 15 gpcd (57 lpcd).

b) Junior High and High Schools: 20 gpcd (76 lpcd).

(3) Commercial/Industrial/Church: 2,500 gpd/acre.

(4) Parks: 500 gpd/acre.

(5) Peak to average ratio: See CVDS 18.

3-301.2 Pipe design capacity based on Manning's flow equation:

(1) Use 1/2 full design flow for diameters up to and including 12 inches.

(2) Use 3/4 full design flow for diameters greater than 12 inches (30cm).

(3) "n" factors

a) for vitrified clay or reinforced concrete pipe:

1) n = 0.013 for pipes up to 21" (53cm) diameter;

2) n = 0.012 for pipes greater than 21" (53cm) diameter;

b) for PVC pipe, n = 0.012 for PVC pipe all sizes.

(4) Velocities:

a) Minimum = 2 feet/second (.61m/s). See Section 3-302.2(6) also.

b) Maximum = 12 feet/second (3.6m/s) (except as approved by City Engineer).

3-302 System Design Criteria

3-302.1 Minimum Pipe Sizes

(1) Public Sewer mains: 8 inches (20cm).

(2) Sewer laterals: 4 inches (10cm).

3-302.2 Grades

(1) Grades shall be determined by using design flow and velocities with the exception that minimum grade for 8" (20cm) sewer shall not be less than 0.4%.

(2) Sewer construction on grades of 20% or more, in newly compacted fills, shall use concrete anchors per Regional Standard Drawing No. S-9, at intervals of not more than 40 feet (12m), between anchors. Backfill shall be rounded over trench.

(3) Sewer constructed on grades of 20% or more, under conditions other than above, shall use cutoff walls per Regional Standard Drawing No. S-10, at intervals of not more than 40 feet (12m), between cutoff walls.

(4) Grades above 65% shall use cast iron pipe, Class 150, without bedding.

(5) Portions of sewer systems, which serve the equivalent of less than 10 residential lots, shall be constructed at a minimum grade of 2% if vitrified clay pipe is used or 1% for PVC pipe.

(6) Sewer mains that do not sustain 2 fps at peak flow shall be designed to have a minimum slope of 1%.

3-302.3 **Cradle/Encasement Requirements Depth** ;(depth of cover is measured from the top of pipe to finish grade)

(1) PVC - Per Manufacturer's Recommendations for long-term deflections not to exceed 5%.

3-302.4 **Trenching and Backfill** Regional Standard Drawing No. S-4.

3-302.5 Deep Sewer Requirements

(1) Deep Sewer Connections - Sewer mains greater than 15 feet (5m) deep with lateral connections shall be constructed in conformance with CVCS 14. Parallel sewer line shall be constructed for the full length of the deep sewer.

(2) Deep Sewer Laterals - Sewer laterals greater than 15 feet (5m) deep shall not be permitted without written approval of the City Engineer. A shallower, parallel sewer main shall be constructed to receive the lateral flows. The shallower sewer main shall connect to the deeper sewer at a manhole.

(3) Deep Sewer Mains - Sewer mains greater than 20 feet (6m) deep shall be constructed with PVC pipe, Class 900 for pipe diameters 12-inches or less and Class 905 for pipe diameters greater than 12-inches, from manhole to manhole.

3-302.6 Manholes

(1) Sewer manholes shall be per Regional Standard Drawing Nos. S-2 and M-3.

(2) Maximum distance between manholes = 400 feet (122m).

(3) Maximum distance from manholes to plugs on grades not exceeding 7% = 200 feet (61m).

(4) Manholes shall be provided as determined by the City Engineer.

(5) In a cul-de-sac, all sewers shall terminate in a manhole.

(6) Sewer Cleanouts shall be provided at a maximum of 100 foot (30m) intervals for sewer laterals.

(7) The manhole connecting a force main and gravity sewer and the four downstream manholes, shall be lined with T-lock or equivalent.

(8) Locking manhole covers per RSD M-4 shall be used on all major and prime streets at all intersections.

3-302.7 Sewer Locations

(1) **Sewer Trunks and Mains**

a) Sewer trunks and mains will normally be located on the centerline of streets for streets without medians unless otherwise approved by the City Engineer.

b) Sewer trunks and mains will normally be located in the center of the driving lane for streets with medians unless otherwise approved by the City Engineer.

c) The angle of connection in manholes for sewer pipes greater than 10" in diameter shall not exceed 45° and 30' minimum shall be provided between the manholes unless otherwise approved by the City Engineer. Manholes shall be centered in driving lanes.

d) Sewer mains between residential lots should be avoided to the maximum extent possible.

(2) **Sewer Easements**

a) Sewer easements shall be equal to the pipe diameter plus ten feet (3m) or a minimum of 15 (4.6m) feet in width, whichever is greater. Sewer easement shall not split residential lots unless specifically approved by the City Engineer.

b) Permanent obstructions within (or over) the easement which would hinder the maintenance of sewer facilities within the easement (i.e. fences, walls, steep slopes, overhanging eaves) are not allowed.

c) Easements shall be granted to provide access to all sewer manholes.

(3) Sewers that may be extended in the future shall be constructed to the boundary of the land being developed, or to the end of permanent improvements as determined by the City Engineer.

(4) Sewer and water lines paralleling each other shall be separated by a minimum of 10 feet (3m).

(5) Sewers crossing water lines shall cross under the water line.

(6) Deep sewer connections shall be in accordance with CVCS14.

3-302.8 **Sewer** constructed along curved alignments

(1) **Horizontal Alignment**:

a) Minimum pipe centerline radius shall conform to "Green Book" specifications (Table 306-1.2.13 (C)). Lesser radii may be approved in accordance with manufacturer's specifications upon approval of the City Engineer.

b) Curves of radii exceeding 200 feet (61m) may be formed by the deflection of each joint or by use of specially beveled pipe.

c) Curves of radii equal to 200 feet (61m) or less will use two-foot length pipe for every other length when using joint deflections.

d) Short radius curves may be formed by the use of short pipe with deflected joints, beveled pipe, or a combination of both.

(2) **Vertical Curvilinear Alignment**. Although straight grades are preferred between manholes, vertical curves, using criteria given for horizontal alignment, above may be used upon approval by the City Engineer.

3-302.9 Sewer Laterals

(1) All sewer laterals shall be in accordance with Regional Standard Drawing Nos. S-13.

(2) Deep sewer lateral connections shall be in accordance with CVCS 18. Sewer laterals deeper than 15 feet are not allowed without written approval of the City Engineer.

(3) Minimum grade for sewer laterals is 2%, unless otherwise approved by City Engineer.

(4) Each sewer lateral shall have one sewer cleanout placed at the property line per CVCS-20 and CVCS-21. If the edge of sidewalk is at the property line, the cleanout shall be placed within the adjacent general utility easement.

(5) To the maximum extent possible, sewer laterals shall not be placed under driveways.

3-302.10 Private Sewers

(1) Private sewer mains shall be designed to public standards and shall be submitted for review and approval by the City Engineer.

3-303 Force Sewer Mains and Sewer Pump Stations

3-303.1 General

(1) Construction of force sewer mains and sewage pump stations shall be avoided unless other options are unavailable. Permanent sewer pump stations are not desirable and generally will not be approved. Permanent or temporary sewer pump stations may be approved only in accordance with the provisions of City policy No. 570-03, adopted by Resolution No. 17491.

(2) Easements shall be granted to the City of Chula Vista for all temporary pump stations, as deemed necessary by the City Engineer. Documents granting said easements, shall be recorded prior to City acceptance of the pump station. Permanent pump stations shall be located on parcel(s) granted, or owned, in fee to the City of Chula Vista.

(3) Developer shall enter into agreements with the City of Chula Vista that define pump station maintenance, operation, billing, responsibilities, and acceptance of temporary pump stations. Said agreement shall be approved by the City Council and be in accordance with City Policy No. 570-03.